National Aeronautics and Space Administration Goddard Earth Science Data Information and Services Center (GES DISC)

README Document for Carbon Monitoring System (CMS) Methane (CH4) Flux for North America

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Revision History

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1.0 Introduction

This document provides basic information for using the Carbon Monitoring System (CMS) Methane (CH4) Flux for North America data derived from Greenhouse Gases Observing SATellite (GOSAT) observations. More details about the observations and algorithm are described in Turner et al 2015.

1.1 Dataset/Mission Instrument Description

The NASA Carbon Monitoring System (CMS) is designed to make significant contributions in characterizing, quantifying, understanding, and predicting the evolution of global carbon sources and sinks through improved monitoring of carbon stocks and fluxes. The System will use the full range of NASA satellite observations and modeling/analysis capabilities to establish the accuracy, quantitative uncertainties, and utility of products for supporting national and international policy, regulatory, and management activities. CMS will maintain a global emphasis while providing finer scale regional information, utilizing space-based and surface-based data and will rapidly initiate generation and distribution of products both for user evaluation and to inform near-term policy development and planning.

1.3 Data Disclaimer

The data should not be used in publications without first contacting the investigators. The Carbon Monitoring System (CMS) Methane (CH4) Flux for North America data may be acknowledged using the following DOI:

10.5067/RF3R3G9I3UVX

2.0 Data Organization

The Carbon Monitoring System (CMS) CH4 Flux for North America data are averaged on a 0.5 degree latitude x 0.667 degree longitude grid. The CH4 emission values are reported once per month for each grid cell for 9 different emission sectors.

2.1 File Naming Convention

The file names of the Carbon Monitoring System (CMS) CH4 Flux for North America (CMS_CH4_FLX_NA) product are defined as follows:

CH4_flux_YYYYMM.nc4

Where:

- YYYY = 4 digit year
- MM = 2 digit month of they year.

2.2 File Format and Structure

The files are stored in NetCDF-4 format.

3.0 Data Contents

Sptial Grid: The emission is reported as a 3D variable. The first dimension is for the 9 different emission sectors given below and the 2nd and 3rd dimensions are latitude and longitude, respectively. The sectors are ordered as follows:

1. Total
2. Wetlands
3. Livestock
4. Oil/Gas
5. Waste (Landfills+wastewater)
6. Coal
7. Rice
8. OpenFires
9. Other

Dimension of other variables: lat = 121, lon = 151

The units and longname and fill values are given in variable attributes called “units”, “long_name”, and “_FillValue”.

Data Fields:

Data Field Name	Description
emissions	CH4 flux in Gg/year
lat	Latitude in degrees
lon	Longitude in degrees
yr	The year
mon	The month as a number from 1-12

4.0 Options for Reading the Data

4.3 Programming Languages

The data can be read using major programming languages such as Fortran, C, Java, IDL, Matlab, and Python.

4.1 Command Line Utility

ncdump
The ncdump tool can be used as a simple browser for HDF data files, to display the dimension names and sizes; variable names, types, and shapes; attribute names and values; and optionally, the values of data for all variables or selected variables in a netCDF file. The most common use of ncdump is with the –h option, in which only the header information is displayed.

ncdump [-c|-h] [-v ...] [[-b|-f] [c|f]] [-l len] [-n name] [-d n[,n]] filename
Options/Arguments:
[-c] Coordinate variable data and header information
[-h] Header information only, no data
[-v var1[,...]] Data for variable(s) <var1>,... only data
[-f [c|f]] Full annotations for C or Fortran indices in data
[-l len] Line length maximum in data section (default 80)
[-n name] Name for netCDF (default derived from file name)
[-d n[,n]] Approximate floating-point values with less precision filename File name of input netCDF file

Note: the ncdump tool will only display variables whose ranks are great than 1. In other words, you will not see one dimensional vectors such as *satheight* using this tool. The ncdump program can be found in bin directory of the HDF installation area. Consult your local computer system administrator for the specifics.

4.2 A tool for simple visualization

Panoply, developed at the Goddard Institute for Space Studies (GISS), is compliant with NetCDF Climate and Forecast (CF) Metadata Convention that is gaining popularity. A strength of the tool is that data can be previewed “remotely” over the network – i.e. user can preview file content of HDF files stored on a remote site, without downloading them. Panoply is available from GISS:

http://www.giss.nasa.gov/tools/panoply/

5.0 Data Services

Data services and access methods can be found on the dataset landing page for the methane product:

http://disc.sci.gsfc.nasa.gov/datacollection/CMS_CH4_FLX_NA_*1.html*.

If you need assistance or wish to report a problem:
Email: gsfc-help-disc@lists.nasa.gov
Voice: 301-614-5224
Fax: 301-614-5268
Address:
Goddard Earth Sciences Data and Information Services Center NASA Goddard Space Flight Center Code 610.2 Greenbelt, MD 20771 USA

7.0 Acknowledgements

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References

Turner, A. J., Jacob, D. J., Wecht, K. J., et al. 2015, Atmospheric Chemistry & Physics, 15, 7049